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THE SOUTHERN WATER-SHED OF HUDSON'S BAY.

We promised in our issue of yesterday to give a summary of the very interesting lecture which Mr. Chrysostôme Langelier delivered, on Tuesday evening, before the Conservative Association.

The following is the conclusion which is a synopsis of the whole work.

1. The Southern water-shed of Hudson's Bay, that is to say, that portion of the territory ceded to Canada by the Hudson's Bay Company which is bounded to the North by the 60th degree of latitude, to the East by the 80th degree of longitude from Greenwich, to the South by the summit line of the Laurentian range and to the West by a line crossing diagonally the 110th degree of longitude from the North-West to the North-East, covers an area of about 750,000 square miles or more than three times the extent of the province of Quebec. From this area however, we must deduct about 250,000 miles for the space covered by the waters of the Southern portion of Hudson's Bay and of James' Bay which leaves a superficies of 500,000 square miles of land or more than twice the extent of the province of Quebec ;

2. The configuration of this territory resembles the lateral section of a truncated cone or the arc of a circle of which the Laurentian range forms the circumference, the Southern portion of Hudson's Bay and James Bay the centre and the great rivers, which flow into these two bays, the radii.

The surface of this immense territory is everywhere level, but slightly broken by a few rocky mounds of small extent, barely two or three hundred feet in height, in the lands of crystalline origin which adjoin the summit of the Laurentides, which barely rise to a height of one thousand feet above the level of the sea, to the South of James Bay, and slope gradually towards the North-West. Between the Laurentides and the sea the level of the soil sinks imperceptibly to such an extent that we hardly find two or three falls fifty feet in height, at the point where the crystalline soils meet the softer formation of the silurian age on the course of all the large rivers which traverse this region, to flow into James or Hudson's Bay.

3. These slightly elevated lands forming the narrow strip which bounds the whole of the territory to the South-East, to the South and the South-West belong to the Laurentian and Huronian formation ; they are more undulating and dryer than those of the interior zone which belong to various ages of the silurian group. In this zone the soil is swampy and damp in certain places, because it is too flat ; but it is almost entirely composed of clay

in strata or in alluvial deposits, of vegetal detritus and superficial deposits which constitute excellent farming land. Lakes are comparatively few in number, but this does not prevent one from easily finding everywhere inexhaustible quantities of good drinking water, by merely digging a few feet into the earth.

4. This vast territory contains at least 244,600 square miles or 161,664,000 acres of good farming land, which is susceptible of the highest degree of cultivation, both as to soil and climate, which are as good if not better than the soil and climate of the "fertile belt" of the Saskatchewan. This farming land is distributed as follows in each of the three natural divisions of the territory:

Eastern Region or East Main, 9,000 miles or 5,760,000 acres;

Southern or James Bay Region, 170,000 miles or 108,800,000 acres;

Western or Churchill and Nelson Rivers Region, 73,600 miles or 47,104,000 acres.

Supposing that these regions should be settled in proportion to the average area occupied in proportion by each farmer in the province of Quebec, it contains a sufficient extent of good land to support with ease and comfort, a population of 15,000,000 as to the area occupied and 31,500 as to the area under cultivation.

Taking as a basis the data supplied by the census of 1871 for the province of Quebec, each of the three regions of territory which we are now considering could support the following population:

	Souls.	Souls.
East Main Region.....	64,000	128,000
James Bay Region.....	10,880,000	21,720,000
Churchill and Nelson Rivers Region.....	4,700,400	9,426,000
Total.....	15,654,400	31,274,000

The figures in the column to the left are based upon the area occupied, and those to the right upon the area under cultivation in the province of Quebec in 1871.

5. Forests of timber, suitable for domestic use and for exportation, cover an area of at least 200,000,000 acres. As far as George or Grand River in the East Main Region and to a distance of fifty miles from the sea, on the banks of the Nelson and Hayes Rivers, there are forests with trees which may be cut into logs of twenty four inches in diameter, chiefly of white spruce. The principal timber consists of white pine, red pine, white spruce, red spruce, cypress or Banks pine, aspen poplar, fir balsam, cedar, poplar and white birch. White spruce is the most abundant and valuable; in the three regions it forms forests which, in extent and in the size of the trees, are far superior to the forests of the same kind which we have in the Province of Quebec. Red spruce forms forests which are almost as fine, in the country situated to the South of James Bay. There are fine forests of white pine, some of red pine of lesser extent in the strip adjoining the height of land between Lake Abittibi and the sources of the Kenogami River. They are the continuation of the forests of the Upper Ottawa. Throughout the region are also to be found balsam and cedar of sufficient dimensions to be used as lumber. White birch is of great size in the vicinity of Norway House, where the Indians tap it in the spring to make syrup of its sap, just as we make sugar in Canada with the sap of our maples.

The aspen and poplar predominate in the valley of the Beaver River and Green Lake, where the trees attain colossal proportions and form fine forests. These forests might be used to advantage to obtain supplies of wood for the lumber trade.

The great areas of territory which they cover in the East Main and James Bay Regions are intersected by numerous large rivers whose course is generally free and nowhere interrupted by serious obstacles. On the majority of these rivers, logs may be floated with the greatest ease from the height of land to the sea, a distance of about three hundred miles from the most remote points. Then, from the farthest ports of James Bay the distance to English ports is not great; it is even less than between Quebec and Liverpool, and very little more than between the chief ports of the United Kingdom and those of the Baltic sea, whence comes the greatest portion of the lumber imported into England.

6. In this region there are mines of incalculable extent and richness. The principal minerals are iron, lead, copper, manganese, silver, lignite, anthracite, gypsum, petroleum and different kinds of ornamental stone.

The most precious kinds and those which are easiest to work are iron, lead, lignite, manganese and gypsum.

There are considerable deposits of magnetic iron ore on the banks of the river Mattagami, of red hematite or red iron ore in the diluvial beds of the Albany river, brown hematite or bog iron ore at the grand rapids of the Mattagami river, (this ore has assayed 52.43 per cent of iron.) But these mines are not to be compared to those in the islands of the Straits of Nastakopa, where spathic iron containing manganese is found in inexhaustible quantities. In all these islands, which form a chain more than ninety miles in length, iron ore is found on the surface to a depth of twenty feet. Two specimens of this ore have respectively given 25.44 and 27.88 of iron, thus proving it to be a very profitable ore to work, since, according to Osborne, who is an authority on the subject, any iron ore which contains at least 6 per cent of metal may be worked with profit. The ore at Nastakoka contains nearly twice this proportion of iron.

Besides this quality, it may be extracted under peculiarly advantageous conditions. The ore forms the upper stratum of the soil which is completely bare; the rock, as Dr Bell says, has been fractured by the action of the air and ice so that a great portion of the ore may be taken out without mining, thereby greatly reducing the cost of extraction, and consequently that of the ore when taken out of the mine, and enabling it to be delivered at the blast furnaces for a trifle. In the neighborhood of the islands good anchorage exists everywhere for vessels of the greatest draught, which may be moored or anchored with the greatest security and ease.

These beds are sufficiently rich and extensive to yield at least 40,000,000 tons of iron.

This ore is almost unequalled for the manufacture of certain kinds of steel and especially Bessemer steel, which has come into such general use during past years especially in making rails.

In England and in the United States, principally at Troy, a good many of the Bessemer steel factories are supplied with pig iron derived from the spathic iron ore which is imported in large quantities from Germany. In the United States, since a few years, thirteen foundries have been started in which Bessemer steel is made for the purpose of being worked up into steel rails, to such an extent does the demand therefor increase. These foundries employ 10,840 workmen whose wages, in 1881, amounted to \$4,980,329. For the same year, the yield of these foundries was \$55,835,000 and the expenditure for raw material, repairs, &c., reached the amount of \$36,375,926. The capital invested in these thirteen establishments is \$21,000,000. In France, there are more than thirty-five foundries where spathic iron ore is transformed into white cast-iron, in large plates, and into steel. Finally, in Germany it is with the same ore, generally of inferior quality to that of Nastakopa, that is made the famous steel of Styria and of the banks of the Rhine, which is much superior for some purposes to case-hardened steel. The presence of manganese in the spathic ores, such as those of Nastakopa, renders the malleable iron obtained from them much better suited for the manufacture of steel, and in Sweden, when the manganese is deficient, its want is supplied by certain manganeseiferous mixtures which are introduced into the iron ore during the smelting.

Our Nastakopa ore is therefore of superior quality in this respect, since it contains 24.64 per cent of manganeseiferous carbonate, according to the analysis made by professor Hoffmann. It is therefore an undoubted fact that these mines contain immense riches, of incalculable value, and may be worked with ease and economy; that we find in them ores from which the best Bessemer steel in the world may be made, and that the working of these mines would greatly contribute to the settlement of the entire adjacent region, as well as of the territory of James Bay. The mines of red iron ore, of magnetic iron and bog iron ore in the latter region are also of great value; but their working would probably be delayed by that of the spathic ores of Nastakopa which offer so many advantages and such brilliant prospects.

Galena forms a stratum of about thirty feet in thickness and extends along the shore of the sea from the mouth of Whale river, as far as Richmond Bay, a distance of about

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thirty miles. This Galena contains more than 80 per cent of lead, and two specimens assayed by Dr. Harrington yielded respectively 5.104 and 12.03 ounces of silver to the ton of 2,000 lbs.

These mines may be worked with the greatest ease and were worked in 1858-59 by the Hudson's Bay Company, which extracted nine tons of ore from some shafts in the neighborhood of Whale River. The quantity of silver to be found in the ore is sufficient to pay for a great portion of the expense of working these mines, which cannot fail to attract the attention of capitalists.

Manganese, which is found in such large quantities in the spathic iron ores of Nastakopa, is a mineral of the greatest utility. It is used in the preparation of chlorine and more than 20,000 tons are imported into England every year. It is therefore an article of importance and as it passes into the slag produced by the smelting of spathic iron ore, the working of this ore would enable us to produce manganese at a lower price and in greater quantities than it can be anywhere else. For this reason, these ores might be worked under peculiarly advantageous circumstances since we would obtain at the same time iron and manganese, which are both very useful metals.

The copper mines of Lake Abatagomaw, contain vast riches which may be turned to account when this region will be crossed by a railway running from Quebec to James Bay. These superficial deposits cover an area of several square miles, and the extraction of the ore is all the more easier and inexpensive, that the coppery rock forms the upper stratum of the soil.

For some time the Canadian Pacific Railway Company has been using lignite, from the mines on the Souris river, for its locomotives. It is said that this species of coal gives more heat and less smoke than that which is generally used. This would give a value to the lignite mines discovered in the valleys of the Moose, Missinait, and Albany Rivers. This lignite, if we may judge by professor Hoffman's reports, is of superior quality. Some seams are as much as three feet thick, and more extensive, if not more careful, researches than have been hitherto made, will show that these deposits of fossil coal cover an area of several thousand square miles. The coal derived from them may be used as fuel on the railways and especially for smelting the spathic iron ore of Nastakopa. The chief objection to the use of lignite in smelting iron ore is the sulphur contained in the ashes and which might mix with the molten metal. Now we have seen that this objection is removed when the ore contains manganese which absorbs the sulphur of the fuel used in smelting. As the spathic iron of Nastakopa contains a large proportion of manganese it can be smelted without trouble, by means of the lignite found in the region of James Bay within a comparatively short distance, at places whence it may be transported by water and consequently at a very small cost. All these circumstances combined give considerable value to these mines of iron and coal, while they render them considerably easier to work.

The other minerals found in this region and especially gypsum, asbestos and anthracite, offer a vast field of enterprise which cannot fail to be turned to account as the country is settled. We may say without fear of contradiction that the whole of this country constitutes one of the finest and richest mining regions of Canada, if not of North America.

7. The climate throughout the whole of the area which we have stated to be suited for cultivation, is as fine and even warmer in the region of James Bay than in the province of Manitoba and the prairies of the North-West. The farming season, that is the season free from frost, is longer at Moose Factory than at Winnipeg, longer than in the Muskoka district and as long as in the greater portion of the province of Quebec. The fact that the flora in the vicinity of Moose Factory is the same as that about Quebec shows clearly that the climate must be nearly the same in both places. At the Southern extremity of James Bay, the presence and the melting of the ice slightly retard vegetation in the spring, but, in return, the heat given out by the waters of the sea prolongs the mild weather in the autumn, so that, all things considered, the open season is as long as in the Red River country and longer than in the North-Western part of Ontario. The cold is rather severe in winter, as in the North-West, but the air is so clear and pure that the lowest winter temperature can be endured without discomfort. But little rain falls in summer and but little snow in winter. The rivers commence to break up about the end of April; the thaw commences in the latter half of March under a temperature which frequently reaches fifty degrees, the earth is bare at the beginning of May and may be cultivated about the middle of that month. The trees bud generally between the 12th and 15th of May and are in

leaf on the 1st of June, even before that date in some localities, where the climate is milder. In the Southern and South-Western region of James Bay the first snow generally falls at the end of October or beginning of November; the greatest quantity comes with December which is also the coldest month, as a rule. During January and February the weather is healthy, clear and fine.

Generally speaking, the climate of James Bay is at least as warm, and it is less damp, and less foggy than that of the district of Quebec, a fact which has been established by the meteorological observations so far made.

The proof that the climate of this vast territory is well adapted to farming operations is to be found in the cultivation, which has been carried on for over a century in many places. With the exception of wheat, cereals are grown everywhere, as well as the common vegetables, with the greatest ease. The farms of the Hudson's Bay Company on Rupert River, at Moose Factory, Brunswick House, at Osnaburg, the farming done by private individuals at Oxford, Norway House, in the valley of the Beaver River, on the shores of Lake Ile à la Crose, afford abundant evidence of the fact. Upon several of these farms, even on that of Rupert River, the Hudson's Bay Company keeps constantly herds containing as many as eighty head of cattle, to say nothing of sheep, swine and even horses in one or two localities. Unless they are made differently from ours, these animals must be fed with hay and grain, and as none is imported, we must conclude that this hay and grain is harvested on the spot, and this establishes beyond a doubt that cereals can be successfully grown everywhere, and that the climate offers no obstacle to their cultivation.

At Moose Factory they even grow the tomato, a very sensitive plant, without bestowing upon it any more care than in any part of Canada. But little attention has been hitherto paid to the cultivation of wheat, which is not of much use owing to the smallness of the population, and also chiefly because there are no mills to grind it properly; but the experiment made in cultivating it in the region of the Moose and Albany Rivers, about fifty miles from the sea, proves that it succeeds perfectly. Even at Moose Factory the fall wheat stood the winter frosts and ripened well in the month of August following, although this place in spring is surrounded by a damp, cold soil, is exposed to the cold sea winds and is subject to certain unfavorable climatic influences, which are not felt at a slight distance further inland. The successful cultivation of wheat in the Western Region, that is in the valley of the Beaver River and upon the shores of Lake Ile à la Crose, is attested by Bishop Taché and Professor Macoun, who saw with their own eyes what they relate.

Finally it is established that the climate of this vast territory with the exception of a few local and accidental variations is as fine, as warm, as favorable for agriculture as the climate of the greater portion of the province of Quebec, and as that of the Muskoka district and the Northern part of the province of Ontario.

8. The finest part of the country is the Southern or James Bay Region which contains at least 108,800,000 acres of very good arable land, forests more extensive and almost as rich as those of the province of Quebec, valuable mines of lignite, gypsum and iron which can maintain and support with ease a population of at least ten millions of inhabitants, when it is placed in communication with the large commercial centres, by means of a railway.

The Eastern section is valuable chiefly as a mining region. It is there that we find the mines of spathic iron and galena of which we have spoken.

The Eastern section, especially the upper valley of the Nelson River contains about forty million acres of good land and forests of timber suitable for domestic use and for exportation. This region occupies an excellent commercial position.

It is there that all the produce of the Western prairies will be brought, if the Nelson River railway is built and regular ocean navigation established between York Factory and Liverpool, shortening by several hundred miles the distance between the fertile plains of the North-West and the ports of Great Britain.

Therefore in that great country which we designate under the name of the *Southern Water Shed of Hudson's Bay* there is sufficient land fit for cultivation, both as to mildness of climate and good quality of the soil, to support a population of thirty millions of inhabi-

tants, if we suppose that the extent of each holding will be of the same proportions as in inhabited parts of the province of Quebec. We are willing to concede that this cannot be fully realized for a long time to come and that the wooded lands of the James Bay Region will probably not attract a very large number of settlers, so long as the prairie lands of the West, continue, as in the past, to be the favorite field for emigration. But this does not destroy the facts nor prevent the James Bay Region from being an excellent farming country in which millions of poor people now living in poverty and hardship in Europe might find homes in which they would live in comfort and prosperity. Neither does it do away with the existence, in that region, of forests and mines of incalculable extent and richness, which may be worked with the greatest ease and profit and if we could only succeed in convincing some enterprising capitalists of all this, we would have attained to a great extent the object we had in view in writing this essay.